

C l a i m s

- 1.) A needleless injection device with a lower part receiving the agent cartridge and an upper part providing the energy needed for injection; the upper part contains energy store units capable of elastic form-change, while the lower part is attached to the upper part revolving manner, as known in itself, in a way that rotating it in relation to the upper part, it does constrained movement in the direction of the device's longitudinal axis, approaching the upper part, and results the tension state of the energy storage structural elements; furthermore, the device has a lock maintaining the tension of the energy storage units and component to release the lock; **characterized by** that among the energy storage structural parts (3) there is at least one start unit (31), capable of storing min. 60%, in this case 80-90% of the total discharge energy (pressure), with the reversible elastic distortion at max. 25%, practically 15-20% of the internal length of the agent cartridge (8); wherein the device (20) is provided with separate structural components for stretching the start unit (31) and limit its relaxation.
- 2.) The device according to claim 1 characterized by that the start unit (31) is a bundle of polyurethane springs or metal plate springs, fitted inside the device (20) in a separate case (32), and at stretching it is joined with the mean transferring the stretching power by a spacer (33) having no contact with the other energy storage parts (3), in this case with the lock mechanism (4).
- 3.) The device according to claim 1 or 2 characterized by that beside the start unit (31), it is also fitted with supplementary unit(35) energy storage components (3), as plate and/or volute springs.
- 4.) The device according to any of claims 1 - 3 characterized by that the supplementary unit (35) optimally comprises 2-8, in this case 4-5 volute springs fitted coaxially in each other, surrounding the geometric axis of the upper part (2), or in the case of more supplementary units (35), these are positioned symmetrically around the geometric axis.

5.) The device according to any of claims 1 - 4 characterized by that practically the release mechanism (5) is a release button (51) situated at the top of the upper part (2), attached to a release rod (52) reaching down to the lock mechanism (4) in the axis of the upper part (2).

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6.) Needleless injection device with an energy storage unit or units, energy releasing unlock mechanism, a part receiving the agent cartridge and an agent-cartridge belonging to it precisely fitting into the cartridge receiving lower part of the device, characterized by that the interior of the cartridge receiving lower part (1) of the device (20) conically dilates towards the discharge hole (82), and the shape of the cartridge (8) is a truncated cone precisely seating in the said lower part (1), that is the angle of inclination on the conical superficies of the cartridge (8) is precisely equal to the conical angle of the receiving lower part's (1) interior.

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7.) The device and cartridge according to claim 6. characterized by that the internal bevel angle of the lower part (1) receiving the cartridge (8) is $1.2 - 1.8^\circ$, preferably 1.5° , and the external bevel angle of the cartridge (8) precisely equals to the the current actual bevel angle of the socket in the lower part (1) at all times.

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8.) The device according to claim 6 or 7 characterized by that it has a start unit (31) containing most of the total energy among the energy storage units (3), and it is supplied with separate components, here a spacer (33) and a case (32), to set up the tension and to limit the relaxation.

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9.) The device according to any of claims 6 - 8 characterized by that the discharge hole (82) of the cartridge (8) is manufactured from the cartridge's own material.

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10.) The device according to any of claims 6 - 9 characterized by that the discharge hole (82) of the agent cartridge (8) is situated precisely in the axis of symmetry of the cartridge (8).

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11.) Cartridge for the needleless injection device, to store the agent, manufactured from by the sanitary authority permitted plastic applicable for die-cast technology, with a discharge hole for the injection of agents, with a regular cylindrical interior, containing a piston, **characterized by** that the wall thickness of the cartridge (8) is at most 1.5 mm, the diameter of the discharge hole (82) is at most 0.2, preferably 0.1 mm, manufactured from the cartridge's (8) own material.

12.) The cartridge according to claim 11 characterized by that the plastic applied for manufacture is a polycarbonate, polypropilene or polyethylene, or a combination of thereof.

13.) The cartridge according to claim 11. or 12. characterized by that the interior of the cartridge (8) is lead from the discharge hole (82) to the cylindrical section of the cartridge (8) with a segment of evolvent profile.

14.) The cartridge according to any of claims 11.-13. characterized by that its external surface has the shape of a truncated cone precisely fitting into the conical socket of the lower part (1) of the injection device (20) receiving the cartridge, where the bevel angle of the external superficies of the cartridge is identical with the internal bevel angle of the socket in the lower part (1) of the device(20).

AMENDED CLAIMS

**[Received by the International Bureau on 11 February 2005 (11.02.2005):
claims 1-5 replaced by amended claims, original claims 6-14 are unchanged (3 pages)]**

- 1.) A needleless injection device with a lower part receiving the agent cartridge and an upper part providing the energy needed for injection; the upper part contains energy store units, namely start unit(s) and supplementary unit(s),
5 capable of elastic form-change; furthermore, the device has a lock maintaining the tension of the energy storage units and component to release the lock; **characterized by** that the lower part (1) is attached to the upper part (2) revolving manner, as known in itself, in a way that rotating it in relation to the upper part (2), it does constrained movement in the direction of the device's
10 (20) longitudinal axis, approaching the upper part (2), and results the tension state of the energy storage structural elements (3), at least one start unit (31), capable of storing min. 60%, preferably 80-90% of the total discharge energy (pressure), with the reversible elastic distortion at max. 25%, practically 15-20% of the internal length of the agent cartridge (8); wherein the start unit (31)
15 fitted inside the device (20) in a separate case (32), at stretching it is joined with the mean transferring the stretching power, preferably with the lock mechanism (4), by a spacer (33), having no contact with other energy storage parts (3), like supplementary unit(s) (35).
- 2.) The device according to claim 1 characterized by that the start unit (31) is a
20 bundle of polyurethane springs or metal plate springs.
- 3.) The device according to claim 1 or 2 characterized by that the supplementary unit(s) (35) are plate and/or volute springs.
- 4.) The device according to any of claims 1 - 3 characterized by that a supplementary unit (35) comprising 2-8, preferably 4-5 volute springs fitted coaxially
25 in each other, surrounding the geometric axis of the upper part (2), or using more supplementary units (35), these are positioned symmetrically around the geometric axis.
- 5.) The device according to any of claims 1 - 4 characterized by that practically the release mechanism (5) is a release button (51) situated at the top of the
30 upper part (2), attached to a release rod (52) reaching down to the lock mechanism (4) in the axis of the upper part (2).
- 6.) Needleless injection device with an energy storage unit or units, energy releasing unlock mechanism, a part receiving the agent cartridge and an

agentcartridge belonging to it precisely fitting into the cartridge receiving lower part of the device, **characterized by** that the interior of the cartridge receiving lower part (1) of the device (20) conically dilates towards the discharge hole (82), and the shape of the cartridge (8) is a truncated cone precisely seating in the said lower part (1), that is the angle of inclination on the conical superficies of the cartridge (8) is precisely equal to the conical angle of the receiving lower part's (1) interior.

7.) The device and cartridge according to claim 6. characterized by that the internal bevel angle of the lower part (1) receiving the cartridge (8) is 1.2 – 1.8°, preferably 1.5°, and the external bevel angle of the cartridge (8) precisely equals to the current actual bevel angle of the socket in the lower part (1) at all times.

8.) The device according to claim 6 or 7 characterized by that it has a start unit (31) containing most of the total energy among the energy storage units (3), and it is supplied with separate components, here a spacer (33) and a case (32), to set up the tension and to limit the relaxation.

9.) The device according to any of claims 6 - 8 characterized by that the discharge hole (82) of the cartridge (8) is manufactured from the cartridge's own material.

10.)The device according to any of claims 6 - 9 characterized by that the discharge hole (82) of the agent cartridge (8) is situated precisely in the axis of symmetry of the cartridge (8).

11.)Cartridge for the needleless injection device, to store the agent, manufactured from by the sanitary authority permitted plastic applicable for die-cast technology, with a discharge hole for the injection of agents, with a regular cylindrical interior, containing a piston, **characterized by** that the wall thickness of the cartridge (8) is at most 1.5 mm, the diameter of the discharge hole (82) is at most 0.2, preferably 0.1 mm, manufactured from the cartridge's (8) own material.

12.)The cartridge according to claim 11 characterized by that the plastic applied for manufacture is a polycarbonate, polypropylene or polyethylene, or a combination of thereof.

13.) The cartridge according to claim 11. or 12. characterized by that the interior of the cartridge (8) is lead from the discharge hole (82) to the cylindrical section of the cartridge (8) with a segment of evolvent profile.

14.) The cartridge according to any of claims 11.-13. characterized by that its external surface has the shape of a truncated cone precisely fitting into the conical socket of the lower part (1) of the injection device (20) receiving the cartridge, where the bevel angle of the external superficies of the cartridge is identical with the internal bevel angle of the socket in the lower part (1) of the device(20).